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| EXAMINER | |
|---|---|
| PEREZ DAPLE, AARON C | |

| ART UNIT | PAPER NUMBER |
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| 2121 | 11 |

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Please find below and/or attached an Office communication concerning this application or proceeding.

| Office Action Summary | Application No. | Applicant(s) | |
|---|---|---|---|
| | 09/716,892 | CHANDHOKE, SUNDEEP | |
| | Examiner | Art Unit | |
| | Aaron Perez-Daple | 2121 | |

*-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --*

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

1)☒ Responsive to communication(s) filed on *29 March 2004*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

4)☒ Claim(s) *1-26* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-26* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

**Application Papers**

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

## DETAILED ACTION

1. This Action is in response to RCE filed 3/29/04, which has been fully considered.

2. Claims 3, 4, 18, and 21-22 have been cancelled by Applicant.

3. Amended claims 1, 2, 5-17, 19, 20, 23-25 and new claim 26 are presented for examination.

4. This Action is non-Final.

### *Claim Rejections - 35 USC § 102*

5. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

6. **Claims 1, 2, 5, 7, 8, 11-14, 17, 19, 20 and 23-26** are rejected under 35 U.S.C. 102(e) as being anticipated by Gudaz et al (US 6,510,353) (hereinafter Gudaz).

As for claim 1, Gudaz discloses a method for performing user controllable autotuning of a PID controller, the method comprising:

displaying at least one graphical user input (GUI) element for specifying a desired performance characteristic of a PID controller autotuning algorithm (Fig. 7);

receiving user input to the at least one GUI element indicating the desired performance characteristic of a PID controller autotuning algorithm (cols. 3-4, "A simulation procedure...the selected point.");

configuring the PID controller autotuning algorithm in response to the user input indicating the desired performance characteristic, wherein said configuring produces a configured PID controller autotuning algorithm (cols. 3-4, "A simulation procedure...the selected point."); and

executing the configured PID controller autotuning algorithm to tune the PID controller (col. 4, "According to one aspect...the selected point.");

wherein the user input indicating the desired performance characteristic indicates a desired operation of the PID controller after execution of the autotuning algorithm, and wherein the desired operation includes one or more of stiffness and response time (col. 22, line 55 - col. 23, line 43, "Next, a user may...the selected point.").

7. As for claim 2, Gudaz discloses the method of claim 1,

wherein the PID controller autotuning algorithm executes according to the desired performance characteristic indicated by the user (cols. 3-4, "A simulation procedure...the selected point.").

8. As for claim 5, Gudaz discloses the method of claim 1, further comprising:

displaying a graphical user interface on a display device, wherein the graphical user interface includes one or more user input controls which are operable to receive the user input indicating the desired performance characteristic of the PID controller autotuning algorithm (col. 22, "Referring again to Fig. 8...other desired manner.").

9. As for claim 7, Gudaz discloses the method of claim 5,

wherein the one or more input controls comprise one or more data fields; wherein the one or more data fields are operable to receive respective parameter values indicating the desired

performance characteristic of the PID controller autotuning algorithm (col. 24, "While Fig. 8 has...via a keyboard, etc."; Fig. 7).

10. As for claim 8, Gudaz discloses the method of claim 1,

wherein the user input comprises one or more parameter values indicating the desired performance characteristic of the PID controller autotuning algorithm (cols. 22-23, "Next, a user may...other pattern as desired."); and

wherein said configuring the PID controller autotuning algorithm comprises applying the one or more parameter values to parameters of the PID controller autotuning algorithm (cols. 22-23, "Next, a user may...other pattern as desired.").

11. As for claim 11, Gudaz discloses the method of claim 1,

wherein the user input comprises a user-drawn step response curve, wherein the step response curve is displayed on a graphical user interface on a display device (col. 19, "As indicated above...the simulation plot was generated."), and wherein the method further comprises:

deriving one or more parameter values indicating the desired performance characteristic of the PID controller autotuning algorithm from the user-drawn response curve (col. 19, "As indicated above...the simulation plot was generated.");

wherein said configuring the PID controller autotuning algorithm comprises applying the one or more paramenter values to parameters of the PID controller autotuning algorithm (col. 19, "As indicated above...the simulation plot was generated.").

12. As for claim 12, Gudaz discloses a computer system for performing user controllable autotuning of a PID controller, the computer system comprising:

a processor (102, Fig. 6; col. 19, "Referring now to Fig. 6...desired robustness qualities.")

a memory medium coupled to the processor (102, Fig. 6; col. 19, "Referring now to Fig. 6...desired robustness qualities."), wherein the memory medium stores:

a PID controller autotuning algorithm (col. 19, "Referring now to Fig. 6...desired robustness qualities."); and

a software program operable to configure the PID controller autotuning algorithm in response to user input (100, Fig. 6; col. 19, "Referring now to Fig. 6...desired robustness qualities.");

a display device, coupled to the processor and the memory medium, wherein the software program is executable to display at least one graphical user interface (GUI) element for specifying a desired performance characteristic of a PID controller autotuning algorithm on the display device (col. 19, line 61 - col. 20, line 38, "The routine 100...parameters to use."; Fig. 7); and

an input device which is operable to receive user input to control the at least one GUI element, thereby indicating the desired characteristic of the PID controller autotuning algorithm (col. 24, "While Fig. 8 has...via a keyboard, etc.");

wherein the software program is operable to configure the PID controller autotuning algorithm in response to the user input indicating the desired characteristic, wherein said configuring produces a configured PID controller autotuning algorithm (col. 19, "Referring now to Fig. 6...desired robustness qualities.");

wherein the processor is operable to execute the configured PID controller autotuning algorithm to tune the PID controller (col. 19, "Referring now to Fig. 6...desired robustness qualities."); and

wherein the user input indicating the desired performance characteristic indicates a desired operation of the PID controller after execution of the autotuning algorithm, and wherein the desired operation includes one or more of stiffness and response time (col. 22, line 55 - col. 23, line 43, "Next, a user may...the selected point).").

13. As for claim 13, Gudaz discloses the computer system of claim 12, further comprising:

a display device coupled to the processor (103, Fig. 6), wherein the display device is operable to display a user interface which is operable to receive the user input indicating a desired performance characteristic of a PID controller autotuning algorithm (col. 22, "Referring again to Fig. 8...other desired manner.").

14. As for claim 14, Gudaz discloses the computer system of claim 13,

wherein the user interface comprises a graphical user interface (Fig. 6), wherein the graphical user interface includes one or more user input controls which are operable to receive the user input indicating the desired performance characteristic of the PID controller autotuning algorithm (col. 22, "Referring again to Fig. 8...other desired manner.").

15. As for claim 17, Gudaz discloses the computer system of claim 12,

wherein the PID controller autotuning algorithm is executable according to the desired performance characteristic indicated by the user (col. 19, "Referring now to Fig. 6...desired robustness qualities.").

16. As for claim 19, Gudaz discloses a memory medium comprising program instructions, wherein the program instructions are computer-executable to perform:

displaying at least one graphical user input (GUI) element for specifying a desired performance characteristic of a PID controller autotuning algorithm (col. 19, line 61 - col. 20, line 38, "The routine 100...parameters to use."; Fig. 7);

receiving user input indicating the desired performance characteristic of a PID controller autotuning algorithm (col. 5, "According to a still further...with the selected point."; col. 19, "Referring now to Fig. 6...desired robustness qualities.");

configuring the PID controller autotuning algorithm in response to the user input indicating the desired performance characteristic, wherein said configuring produces a configured PID controller autotuning algorithm (col. 5, "According to a still further...with the selected point."; col. 19, "Referring now to Fig. 6...desired robustness qualities.");

executing the configured PID controller autotuning algorithm to tune the PID controller (col. 5, "According to a still further...with the selected point."; col. 19, "Referring now to Fig. 6...desired robustness qualities.");

wherein the user input indicating the desired performance characteristic indicates a desired operation of the PID controller after execution of the autotuning algorithm, and wherein the desired operation includes one or more of stiffness and response time (col. 22, line 55 - col. 23, line 43, "Next, a user may...the selected point).").

17. As for claim 20, Gudaz discloses the memory medium of claim 19,

wherein the PID controller autotuning algorithm executes according to the desired performance characteristic indicated by the user (col. 5, "According to a still further...with the selected point.").

18. As for claim 23, Gudaz discloses the method of claim 19, further comprising:

displaying a graphical user interface on a display device, wherein the graphical user interface includes one or more user input controls which are operable to receive the user input indicating the desired performance characteristic of the PID controller autotuning algorithm (cols. 5-6, "Referring now to Fig. 1...from one of the PCs 14.").

19. As for claim 24, Gudaz discloses the method of claim 23,

wherein the user input comprises one or more parameter values indicating the desired performance characteristic of the PID controller autotuning algorithm (cols. 22-23, "Next, a user may...other pattern as desired."); and

wherein said configuring the PID controller autotuning algorithm comprises applying the one or more parameter values to parameters of the PID controller autotuning algorithm (cols. 22-23, "Next, a user may...other pattern as desired.").

20. As for claim 25, Gudaz discloses a graphical user interface displayed on a display device, therein the graphical user interface includes:

one or more user input controls displayed in the graphical user interface which are operable to receive user input indicating a desired performance characteristic of a PID controller autotuning algorithm (Fig. 6; col. 22, "Referring again to Fig. 8...other desired manner.");

wherein the user input indicating the desired performance characteristic of the PID controller autotuning algorithm is operable to be used in configuring the PID controller autotuning algorithm (col. 5, "According to a still further...with the selected point." ; col. 22, "Referring again to Fig. 8...other desired manner."), wherein the user input indicating the desired performance characteristic indicates a desired operation of the PID controller after execution of the autotuning algorithm, and wherein the desired operation includes one or more of stiffness and response time (col. 22, line 55 - col. 23, line 43, "Next, a user may...the selected point).").

21. As for claim 26, Gudaz discloses a method for performing user controllable autotuning of a PID controller, the method comprising:

displaying at least one graphical user input (GUI) element for specifying a desired qualitative performance characteristic of a PID controller autotuning algorithm (Fig. 7);

receiving user input to the at least one GUI element indicating the desired qualitative performance characteristic of a PID controller autotuning algorithm (cols. 3-4, "A simulation procedure...the selected point.");

configuring the PID controller autotuning algorithm in response to the user input indicating the desired qualitative performance characteristic, wherein said configuring produces a configured PID controller autotuning algorithm (cols. 3-4, "A simulation procedure...the selected point."); and

executing the configured PID controller autotuning algorithm to tune the PID controller (col. 4, "According to one aspect...the selected point.");

wherein the user input indicating the desired qualitative performance characteristic indicates a desired operation of the PID controller after execution of the autotuning algorithm, and wherein the desired operation includes one or more of stiffness and response time (col. 22, line 55 - col. 23, line 43, "Next, a user may...the selected point.").

***Claim Rejections - 35 USC § 103***

22. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

23. Claims 6 and 15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Gudaz in view of Kennedy et al (US 5,832,532). Although obvious to one or ordinary skill in the art, Gudaz does not specifically disclose the use of a slider control as one of the input controls. However, Gudaz does disclose the use of numeric cells (Fig. 6; col. 24, "While Fig. 8 has...via a keyboard, etc.") for setting and displaying parameter values. Kennedy discloses that a slider control can be used instead of (or in addition to) a cell containing a numerical value in order to allow the user to graphically adjust the parameter value over a range of possible values (col. 11, "Controls are individual display...the mouse on the box.").

It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the user interface of Gudaz by using a slider control in order to graphically adjust the PID controller autotuning characteristics or parameters, as taught by Kennedy.

24. Claims 9 and 16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Gudaz in view of in view of Molnar et al (US 5,734,597) (hereinafter Molnar). Although obvious to one or ordinary skill in the art, Gudaz does not specifically disclose displaying a command line interface on a display device. However, Molnar discloses that a command line interface may be substituted for a graphical user interface, or vice-versa (col. 1 "As users of computers...and Microsoft Windows."), as both can be used to perform equivalent functions (such as setting parameters or characteristics).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to substitute a command line interface for the graphics display interface disclosed by Gudaz, wherein the command line interface is operable to receive the user input indicating the desired characteristic of the PID controller autotuning algorithm, in order to provide an alternate interface method for setting the PID controller autotuning characteristics.

25. Claim 10 is rejected under 35 U.S.C. 103(a) as being obvious over Gudaz. Gudaz discloses that a modified Ziegler-Nichols method may be used in tuning a PID controller (col. 10, "Likewise, the tuning controller...Ziegler-Nichols tuning, to name a few."). Furthermore, the Office notes that both the concept and advantages of using a modified Ziegler-Nichols method are well-known and expected in the art.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to use an autotuning algorithm comprising modified Ziegler-Nichols equations, which are well-known in the art, for the purpose of tuning the controller of Gudaz.

***Response to Arguments***

26. Applicant's arguments filed 3/29/04 have been fully considered but they are not persuasive.

27. First, with respect to the interview dated 2/26/04, the Examiner and Applicant, represented by Mr. Mark Williams, discussed an interpretation of the Gudaz reference presented by Applicant, which interpretation would overcome the Gudaz reference. The Examiner never agreed that this interpretation was valid nor that it was the only interpretation of Gudaz. The Examiner made it clear that further search and consideration would be required. This conversation is summarized in the Examiner's interview summary form, mailed with the Advisory Action, paper no. 9.

On further review, the Examiner respectfully disagrees with Applicant's interpretation of the Gudaz reference. Applicant asserts that Gudaz does not teach a user input indicating a desired *performance* characteristic, wherein the desired performance characteristic includes one or more of stiffness and response time. According to Applicant's interpretation, Gudaz teaches a user input specifying *tuning parameters* and calculating the performance characteristics based on the specified tuning parameters.

In Examining Applicant's argument, the first question is how to define the performance characteristics of stiffness and response time and, further, to determine how these characteristics are indicated by the user. Referring to the example presented on pages 10 and 11 of Applicant's specification, Applicant makes it clear that the terms "stiffness" and "response time" actually refer to the differential gain of the PID controller. Specifically, the user input indicates a term, d, which is used to adjust the differential gain. See especially

lines 9-24 of page 11. Once the user indicates the desired differential gain, the autotuning algorithm of the present invention then adjusts the other controller parameters as shown in Figure 3.

The Examiner finds that Gudaz teaches an equivalent method for receiving a user input indicating a desired *performance* characteristic, wherein the desired performance characteristic includes one or more of stiffness and response time. Specifically, the parameter Td of Gudaz is defined as the derivative action weighting factor (see col. 21, lines 6-51, "Generally speaking, a PID control...or derivative actions."), which is used to control the differential gain (and therefore the stiffness and response time) in a manner analogous to the factor d of the present invention. Gudaz further describes a user input indicating the desired value of Td. As described in col. 25, line 15-35, and col. 28, lines 8-34, the robustness plot (107, Fig. 7) is created by determining the regions of stability for various weights (settings) of the gains, including the differential gain. Furthermore, it is clear that the selection of a point on the robustness map correlates to the selection of specific gain weights, from which the specific auto-tuned control curve is then generated, as illustrated in the lower portion of Fig. 7. Gudaz further anticipates receiving the user input through a variety of means, including a keyboard and other means known to those of ordinary skill in the art (col. 24, lines 23-27, "While Fig. 8...via a keyboard, etc."). Therefore, Gudaz teaches an equivalent method to that claimed in the present invention for receiving a user input indicating a desired *performance* characteristic, wherein the desired performance characteristic includes one or more of stiffness and response time.

Even if Applicant takes issue with the Examiner's position above, Gudaz also anticipates that any other robustness characteristics or measures of stability known to those of ordinary skill in the art could be selected by a robustness curve in an analogous manner (col. 22, line 55 - col. 23, line 29, "Next, a user...pattern as desired."; col. 31, lines 21-31, "While the robustness map...of the robustness qualities."). As taught by previously cited Arcara and Lane (see Final Rejection, paper no. 5) and Applicant's admitted prior art (pg. 10, lines 4-11, "A controlled system's...a particular response time.") (hereinafter AAPA), stiffness and response time are well-known measures of stability that can varied based on user input in an auto-tuning system.

With respect to claim 26 and the recited "qualitative performance characteristic," it is clear from Applicant's arguments (first paragraph of pg. 11) that this term refers to a user selection from a non-numeric user input. Applicant provides the example of a slider control. The Examiner finds that in teaching the selection of a point on a robustness map, Gudaz teaches just such a "qualitative performance characteristic."

For all the reasons above, claims 1, 2, 5, 7, 8, 11-14, 17, 19, 20 and 23-26 are properly rejected under 35 USC 102(e) as anticipated by Gudaz. The rejection of claims 6, 9, 10, 15 and 16 under 35 USC 103(a) is also indicated as proper for the reasons previously cited (Final Rejection, paper no. 5).

***Conclusion***

28. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. US 6,198,246 B1, note Fig. 7; US 5,394,322, note Fig. 1; US 4,602,326, note Fig. 1A; US 5,691,896, note Fig. 3; US 6,44,962, note Fig. 2.

29. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Aaron Perez-Daple whose telephone number is 703-305-4897. The examiner can normally be reached on 9am - 6pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Anthony Knight can be reached on 703-308-3179. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

4/29/04

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